San Francisco Bay Area's Pesticide Toxicity Reduction Strategy

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Introduction

Water quality research conducted by San Francisco Bay Area stormwater programs and wastewatertreatment plants over the last several years has identified widespread toxicity in local creeks and wastewater treatment plant effluent (California Regional Water Quality Control Board, 1997; San Francisco Bay Area Pollution Prevention Group, 1998). The toxicity problem was ultimately traced to diazinon and chlorpyrifos-commonly used organophosphate pesticides available in hundreds of consumer products (Alameda Countywide Clean Water Program, 1997). Study results indicated that pesticide use according to label instructions could not be ruled out as a cause of wastewater and stormwater toxicity (Regional Water Quality Control Plant-Palo Alto, 1996). In May 1999, San Francisco Bay and 35 Bay Area urban creeks were listed by the U.S. Environmental Protection Agency (USEPA) as impaired by diazinon (USEPA, 1999).

Impact of 303(d) Listing on Local Governments

In its action, USEPA listed 53 waterbodies in California as impaired due to diazinon in urban runoff and 7 waterbodies as impaired due to chlorpyrifos in urban runoff. By definition under the Clean Water Act, this action means that there is a water quality problem, regardless of the problem definitions under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) (i.e., "unreasonable adverse effect") or the Food Quality Protection Act (FQPA). The listing action put over 100 municipalities in the San Francisco Bay Area and Central Valley at immediate regulatory, legal, and financial risk.

- Regulatory risk -The State Water Resources Control Board and USEPA can take enforcement action against, and fine, these municipalities for violating their NPDES (National Pollutant Discharge Elimination System) stormwater permits.
- Legal risk Citizen and environmental groups can sue municipalities for the same reasons.
- Financial risk These municipalities must now spend local public tax dollars proactively addressing this problem, and potentially reacting to fines and lawsuits.

Municipalities' Response

To comply with their NPDES stormwater permits, municipalities must meet two broad goals:

- 1. Effectively prohibit non-stormwater discharges into storm sewers.
- 2. Reduce the discharge of pollutants to the maximum extent practicable (MEP).

To meet these goals and to address the 303(d) listing, there are a number of actions Bay Area stormwater programs have taken or plan to take that may reduce pesticide-related toxicity in surface waters. These actions are packaged in a Pesticide Toxicity Reduction Strategy (BASMAA, 2000). The Strategy is a multi-faceted effort including:

Education/outreach including:

- limiting or prohibiting pesticide use by municipal staff and contractors and/or requiring use of best management practices (BMPs) such as Integrated Pest Management (IPM)
- providing adequate and convenient options for disposal of unused pesticides and pesticide containers through household hazardous waste collection programs
- . educating residents about pesticide-related toxicity and proper use and disposal through distribution of educational materials, and development and implementation of media and advertising campaigns
- educating residents about alternative methods and products through such programs as demonstration gardens and point-of-purchase campaigns in hardware stores and nurseries
- educating businesses about proper use and disposal, as well as alternative methods and products for use around their own properties and facilities
- · educating pest control operators and working with them to develop BMPs protective of surface waters
- Regulatory- Identifying opportunities to reduce toxicity and advocating state and federal agencies to seize these opportunities through regulation and re-registration
- Monitoring Investigating the extent and causes of toxicity, and assessing impacts on beneficial uses

The IPM Store Partnership

One exemplary part of the Pesticide Toxicity Reduction Strategy worth describing in more detail is the IPM (Integrated Pest Management) Store Partnership. In 1997, the Central Contra Costa Sanitary District (CCCSD), a wastewater treatment plant located in Martinez, California, jointly developed and successfully piloted the IPM Store Partnership with the Regional Water Quality Control Plant (Palo Alto, California) in four locally owned garden centers and hardware stores. In 1998, the Bay Area Stormwater Management Agencies Association (BASMAA) and the San Francisco Bay Area Pollution Prevention Group (BAPPG) joined together to fund the expansion of the IPM Store Partnership to more stores in the San Francisco Bay Area. By spring 1999, 116 stores in eight Bay Area counties were participating in the Partnership.

The Partners

BASMAA is a consortium of seven San Francisco Bay Area municipal stormwater programs. These programs represent more than 90 agencies, including 79 cities and 6 counties, and the bulk of the watershed immediately surrounding San Francisco Bay. BASMAA agencies agree to a memorandum of understanding and each year collect dues, prorated by population, from their members for a "baseline" program that provides for staff and finances projects-like the IPM Store Partnership—that are endorsed by all member agencies.

The BAPPG is a voluntary association of 39 wastewater treatment plants working together to prevent water pollution in the San Francisco Bay. These agencies represent all of the publicly owned municipal wastewater agencies that discharge into San Francisco Bay in the nine Bay Area counties, and almost all of the watershed immediately surrounding San Francisco Bay. BAPPG's decision-making is done by consensus. Each year, a work plan-with an associated budget-is developed. The budget is allocated among the 39 plants based on the average amount of treated wastewater discharged each day. Contributions are voluntary, although all agencies do contribute. These contributions are used to fund projects like the IPM Store Partnership.

Integrated Pest Management

There are many definitions of Integrated Pest Management. The definition used to guide the IPM Store Partnership was the following:

Integrated Pest Management is an approach that uses regular monitoring and cultural, biological, and physical methods to keep pests at acceptable levels. Only less toxic chemicals are used and only as needed.

IPM was used as the basis for the program because it: (1) focuses on effective alternatives to traditional chemical pesticides; (2) does not substitute another pesticide that may become tomorrow's problem, and (3) does not preclude the use of chemicals in all situations.

Although promotion of IPM was the basis for the program, the term itself is somewhat problematic. The terms "IPM" and "Integrated Pest Management" were used in speaking with experts and agencies familiar with the jargon, but these terms were avoided in communications with the non-initiated (e.g., general public). In addition, the term IPM was not very representative of the situation in the store between the customer and the store employee. Most customers go to a store for help when pests have already reached unacceptable levels, so store employees must start with controlling a pest problem, rather than preventing it, which is the first step in IPM. Despite this challenge, customers were exposed to the full range of IPM methods through the fact sheets and display materials, as well as less-toxic products.

Goals

The goals of the IPM Store Partnership are to:

- Educate the public about the value of IPM approaches to pest control and safe use and disposal of pesticides, when used
- Deliver IPM-related messages without negative messages about any products
- Develop partnerships with retailers so that they can help spread the word about water quality problems related to residential pesticide use
- · Provide consistent messages
- Capitalize on economies of scale
- Prepare the stage for regional program expansion into chain stores

Program Elemen ts

The IPM Store Partnership is an education program for employees and customers of locally owned garden centers and hardware stores. The project elements include:

- development and production of eight fact sheets on less-toxic pest management strategies for the public (Naturally Managing Pests, Controlling Ants, Controlling Aphids in Your Garden, Keeping Cockroaches Out of Your House, Keeping Fleas Off Your Pets and Out of Your Yard, Living with Spiders, Tips for a Healthy Beautiful Lawn, and Safe Use and Disposal of Pesticides)
- development of an extensive list of less-toxic methods and products preferable to diazinon and chlorpyrifos for various applications
- training sessions for store employees focusing on principles of Integrated Pest Management and successful application strategies for products on the less-toxic list
- design and production of a program logo and in-store promotion materials including "end cap" displays, posters, shelf-talkers, shelf signs, and vinyl banners
- program evaluation by a San Francisco State University-affiliated survey research and data analysis firm

Results and Discussion

Although the final evaluation will not be complete until the end of the 1999 in-store promotion season (late 1999), the sponsoring agencies expect it to be successful based on preliminary findings and on the success of the pilot project. Feedback from store owners and employees that participated in the pilot was uniformly positive. The sales data in the pilot IPM Store Partnership showed variations from store to store. One store found that sales of all but one diazinon and chlorpyrifos product dropped. At the same time, less-toxic product sales experienced an overall 17% increase and profits were not affected.

It is the hope of the participating agencies that the final evaluation and report on the 1999 Partnership will be useful as a model and primer for other agencies and jurisdictions concerned about pesticide-related toxicity in surface waters and interested in building educational partnerships with local businesses. While Bay Area water pollution prevention agencies have been coordinating their public education efforts since the early 1990s, the IPM Store Partnership is the first point-of-purchase program implemented regionally. All of the general benefits of inter-agency coordination (support for smaller agencies, cost savings, options for pooled advertising and media relations) are magnified in such a large undertaking.

Based on the partnership's success, all of the agencies that participated in the 1999 Partnership allocated funds for continuation of the program in 1999-2000. BASMAA and the BAPPG again contributed funds to regional coordination. Brainstorming sessions were held in late summer 1999 to determine how to improve the program, and minor modifications were made for 2000.

The IPM Store Partnership is one example of BASMAA and the BAPPG's commitment to use public resources efficiently. Given that philosophy, materials developed by the IPM Store Partnership are available to agencies interested in implementing a similar program.

Other Aspects of the Strategy

Despite the success of the IPM Store Partnership and many of the other educational aspects of the Pesticide Toxicity Reduction Strategy, it is clear to Bay Area water pollution prevention agencies that their efforts alone will not be enough to solve the problem. Study results indicate that less than 1% of applied diazinon runs off, yet it takes less than a fluid ounce of active ingredient flushed into stormwater runoff to cause toxicity in urban creeks (Regional Water Quality Control Plant-Palo Alto, 1996). Educational programs run by Bay Area water pollution prevention agencies are some of the most developed in the country and they have won numerous awards for their quality and effectiveness. Nevertheless, even the best education programs are not 100% effective. It is clear that education alone will not solve this problem.

San Francisco Bay Area stormwater programs are and will continue to address the problem of pesticide-related toxicity in surface waters by way of meeting the MEP requirement in their NPDES permits. These agencies have gone so far as to develop the Pesticide Toxicity Reduction Strategy described above that includes three elements-education, regulatory, and monitoring. The authority and ability of local governments to implement the strategy varies with each element. The most cost-effective and appropriate aspect for local governments to implement is education. For the regulatory and monitoring elements, local governments can, and have, identified the issues and opportunities to reduce pesticide-related toxicity, but they have limited ability or authority to actually implement corrective actions.

Regulatory

Regulation of pesticides including their registration for use in the Unites States is the responsibility of USEPA. California's Department of Pesticide Regulation (DPR) has responsibility for regulating the sale and use of pesticides in California. California DPR, with few exceptions, registers pesticides only after they have been registered by USEPA. California DPR can not register pesticides which have been denied registration by USEPA. At the local government level, the California Food and Agriculture Code grants some authority to county agricultural commissioners for local enforcement of pesticide regulations, record keeping, and outreach to applicators. However, with the exception of county agricultural

commissioners, local governments are prohibited from regulating the registration, sale, transportation, or use of "economic poisons." This regulatory structure means that the ability and authority of local governments is limited to:

- identifying opportunities to reduce toxicity, such as eliminating potentially problematic uses, and advocating that state and federal agencies seize these opportunities through regulation and re-registration
- . in the case of wastewater and stormwater agencies, regulating the discharge of pesticides to the sewer or storm drain to ensure local agencies' compliance with state and federal laws (e.g., Clean Water Act)

Monitoring

Local governments have some ability, authority, and responsibility to use monitoring to address the problem of pesticide-related toxicity of surface waters. To-date, San Francisco Bay Area municipalities have used monitoring to:

- identify and define the problem (Alameda County Urban Runoff Clean Water Program, 1995; Regional Water Quality Control Plant-Palo Alto, 1996; California Regional Water Quality Control Board, 1997; San Francisco Bay Area Pollution Prevention Group, 1998)
- characterize sources (Alameda Countywide Clean Water Program, 1997)
- recommend corrective actions (Alameda County Flood Control and Water Conservation District, 1997)

A review of monitoring data from around the country shows that municipalities in the San Francisco Bay Area and California Central Valley are not alone in their identification of this environmental problem.

- Orange County, California (Lee, et al., 1999) Multi-year studies of stormwater runoff in San Diego Creek as it
 enters Upper Newport Bay have shown that the problem is not restricted to Northern California. Runoff from each
 stormwater event has been shown to be toxic, and about half of the observed toxicity is due to diazinon and
 chlorpyrifos used in urban areas for structural termite and ant control, and lawn and garden pest control.
- NAWQA (USGS, 1998) Results from the United States Geological Survey's (USGS) National Water Quality Assessment Program from 1992 through 1996 show that the problem is in fact a national one. Over 300 samples have been taken from eleven urban streams scattered across the country, from Florida to Connecticut to Oregon, as part of the Pesticides National Synthesis Project. In a recent report on the first cycle of the program, USGS concluded that "urban and suburban areas are substantial sources of pesticides to streams" and that "most urban areas have similar pesticides in streams...and many urban areas may benefit from similar strategies for reduction."
- Publicly-Owned Treatment Works survey (USEPA, 1989) Results from a survey done 10 years ago by USEPA show that pesticide-related toxicity is a wastewater problem as well as a stormwater problem. USEPA's Environmental Research Laboratory in Duluth, working through the National Effluent Toxicity Assessment Center (NETAC), reported on the occurrence of diazinon in 28 POTW effluents. Diazinon was found in sixteen (62%) of the effluents, and levels were greater than or equal to 250 ng/L for nine (32%) of the effluents. NETAC concluded in part "The frequency with which we have observed diazinon in the past, in this survey, and continue to find it in effluents is indicative of a widespread problem."

Clearly this is a national problem caused by products that are registered at the national level and sold across the country.

The pesticide registration process provides a built-in mechanism to use monitoring and science to address this national problem. During the registration process, USEPA must review and summarize the findings of studies conducted on each pesticide. During this step, USEPA may request that "registrants" (e.g., pesticide manufacturers) submit specific studies for review. Based on its review, USEPA can confirm, deny, or change the pesticide's registration including approved uses, sites of application, formulations, and label directions.

Local governments are willing to use monitoring and science to further investigate local impacts and sources, and to host case studies, if USEPA will provide financial and other support, with the goal of conducting representative case studies whose results can be extrapolated across the country. But given the established mechanism in the pesticide registration process, it would be inappropriate and ineffective for local governments to do more. USEPA must exercise its federal authorities and use monitoring and science information to make more informed, up-to-date registration decisions.

Conclusion

Rather than being a tool in and of itself, the Pesticide Toxicity Reduction Strategy is really a toolbox. It includes a number of effective tools for reducing pesticide-related toxicity of surface waters-an increasingly important part of urban water resource management and protection. Every job has its tool and in the right pair of hands, the job can be easy and cost-effective to complete. The wrong tool or the wrong hands can make the job difficult, if not impossible to finish. It is the responsibility of government agencies to be clear and disciplined about which tool and which pair of hands go with which job when fixing environmental problems. The extent to which they implement that concept will determine how successful the work of environmental protection will be.

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